



2001 Calgary Region

EXTERNAL TRUCK SURVEY STUDY

*Forecasting Division
November 2001*



THE CITY OF CALGARY
LAND USE AND MOBILITY
PLANNING AND TRANSPORTATION POLICY

1.0 Introduction

The External Truck Survey was undertaken, in the Fall 2000, to obtain information on the movement of goods to and from the Calgary Region. This survey supplements a more extensive survey of commodity flow conducted within Calgary and region, from 2000 October to 2001 January.

The external survey was administered at 16 different highway locations to approximately 5,000 trucks. Truck traffic in both directions of travel was surveyed during the hours of 8:00 a.m. to 4:00 p.m. The surveys were supplemented with 24 hour vehicle classification counts. Approximately 77% of all truck drivers were interviewed during the survey period.

The study was designed and administered in association with Alberta Transportation and the City of Calgary.

2.0 Survey Methodology

The survey was administered via an interview with a stopped truck driver. Trucks were pulled off the highway into vehicle inspection stations, rest areas, or other areas deemed by Alberta Transportation to be safe for the survey activities. All signing and enforcement was handled by Inspection Service of Alberta Transportation. Figure 1 shows the region with the interview locations.

The survey form (Appendix A) obtained information on:

- type of truck
- truck information (type, # axles, GVW)
- occupancy
- ownership (owned, leased, for hire)
- origin(today's and original)
- destination(today's and final)
- commodity quantity and value
- stops(location, reason, commodity/amount/value delivered/picked up).

The interview required between 60-90 seconds to administer. Lost time for trucks including deceleration from and acceleration to the highway was approximately 8-12 minutes.

Trucks were classified into five categories:

- a. Single unit, single axle
- b. Single unit, dual axle
- c. Semi, no trailer
- d. Semi, one trailer
- e. Semi, multi trailer.

Figure 1 – Study Area and Survey Locations

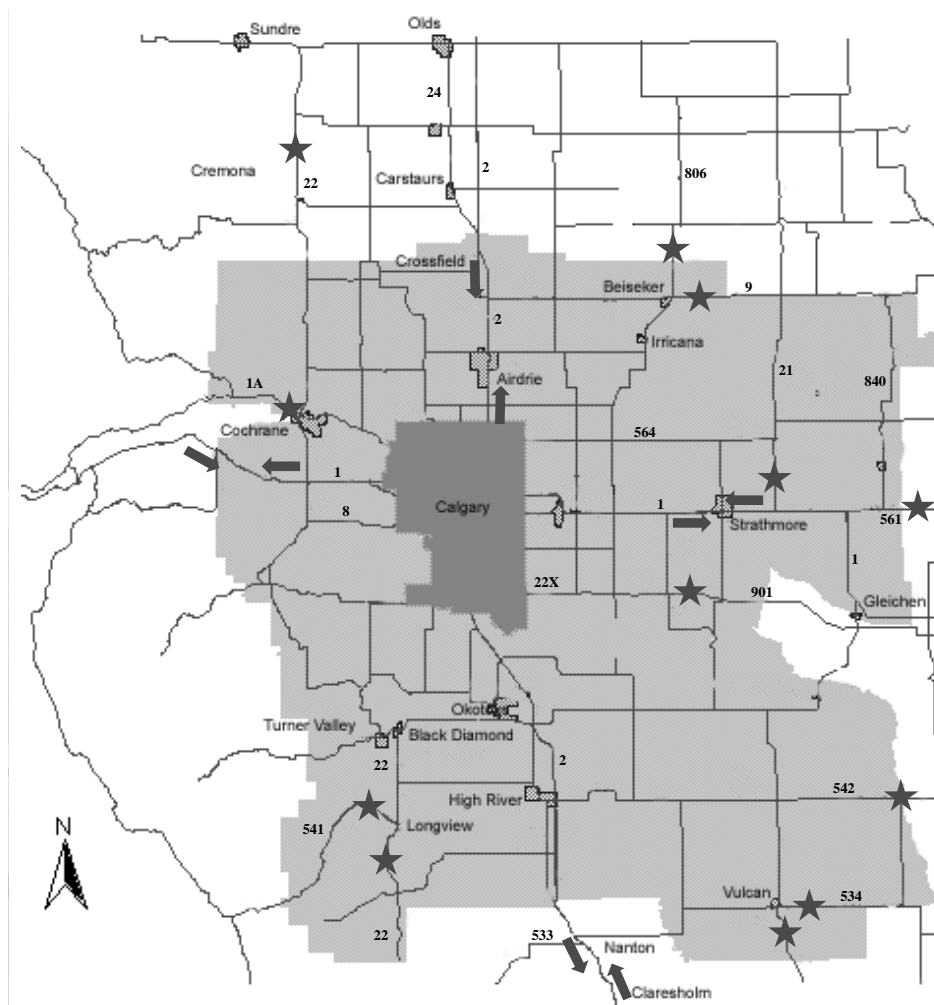


Table 1 shows the completed interviews for each survey location. Approximately 77% of all truck drivers were interviewed during the survey period.

Table 1: Survey Completions (8:00 AM to 4:00 PM)

Highway Locations	Completed Interviews
TCH East	700
TCH West	632
1A	123
2 South	532
2 North	1,597
9	133
21	173
22 South	97
22 North	160
23	204
534	39
541	253
542	30
561	59
806	114
<u>901</u>	<u>123</u>
Total	4,969
Completion Rate	76.9%

TCH: Trans Canada Highway

3.0 Survey Results

3.1 Total Number of Trips on Highways

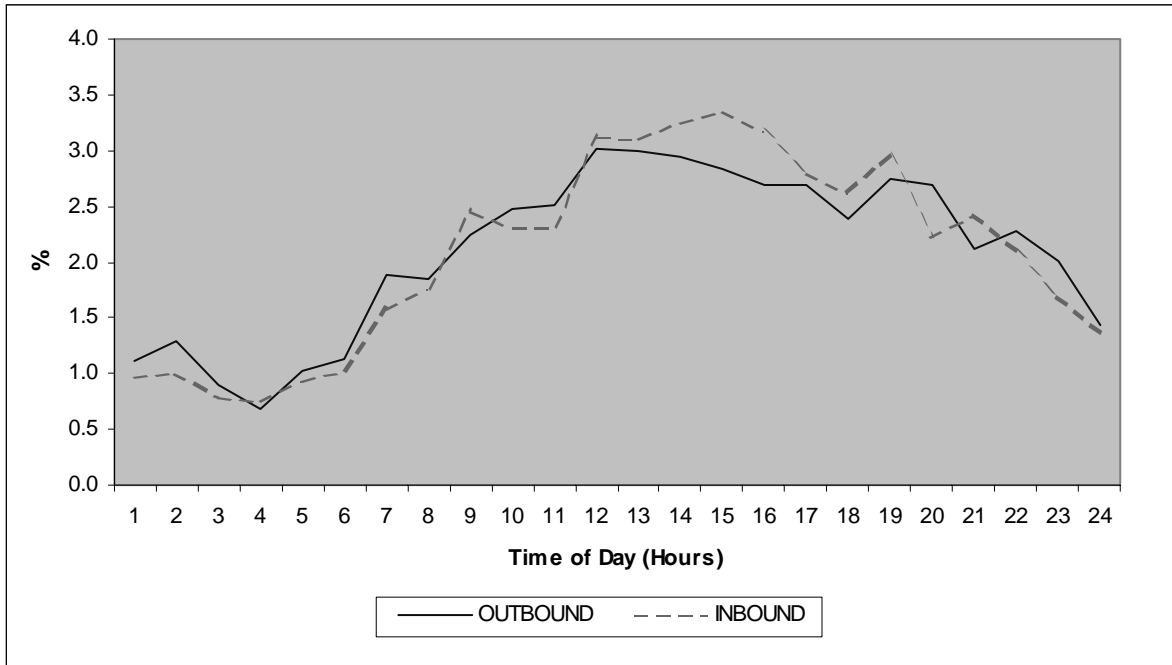
The total number of trucks inbound to and outbound from the Calgary region is 13,360 vehicles/day. The primary highways (Highway 2 North and South, and Trans Canada Highway East and West) accounted for 70% of the trucks on the highway system. Highway 2 North accounted for one third of all the trucks reflecting the link it provides between the two largest urban centres in Alberta – Calgary and Edmonton.

Table 2: 24 Hour Truck Volumes

Highway Location	Vehicles
1A	234
21	489
22 North	337
22 South	457
23	517
2 North	4,531
2 South	1,416
534	77
541	566
542	66
561	191
806	304
9	326
901	380
TCH East	1,870
TCH West	1,599
Total	13,360

Figure 2 shows the distribution of trucks by time of day. Unlike urban road systems where there is a distinctive peak hour, either in the AM or PM peak periods, truck travel on the highway system does not have a high peak hour and the profiles for inbound/outbound are very similar.

Figure 2 – Distribution of External Trucks by Time of Day



For inbound truck traffic the peak hour is 2:00 PM to 3:00 PM with 3.0% of the trucks while the outbound peak hour is 11:00 AM to 12:00 Noon with 3.4% of the trucks.

Table 3 shows the total number of trucks by type for the 8 hour and 24 hour periods. Nearly 50% of trucks of the 24 hour truck volume occurs between the hours of 8:00 AM and 4:00 PM. Although over 70% of the trucks on the highway system are semi trailer trucks, these units have the lowest percentage occurring between 8:00 AM and 4:00 PM. This may be due to a desire to travel during periods of less congestion.

Table 3: Trucks types by Time Period

Time Period Vehicle Type	(8:00 AM ~ 4:00 PM)	24 Hour	Rate (8hour/24hour)
Single Axle, Single Unit	914	1,396	65.4%
Dual Axle, Single Unit	1,081	2,136	50.6%
Semi, No Trailer	91	200	45.5%
Semi, One Trailer	3,069	6,400	47.9%
Semi, Multi Trailer	1,285	3,228	39.8%
Total	6,440	13,360	48.2%

3.2 Distribution Patterns for Truck Trips

The survey recorded truck origins and destinations based on today's travel and also based on the original/final origin and destination. These can be distinguished as follows:

Today's origin/destination:

This records where the truck was located at the start of the survey day (origin) and at the end of the day (destination). It is possible for today's origin and destination to be the same. This occurs for a truck that starts the day at a business in Calgary or a town in the region and ultimately returns after deliveries at the end of the day. The truck driver in this case would provide the stop(s) made on the trip and these stops would be recorded on the survey form.

Original origin/ Final destination:

For a long distance truck this information provides where the trip began and where it will ultimately end. Therefore as an example a truck may have an original origin of Toronto and a final destination of Seattle.

Again, it is possible for this origin and destination to be the same. An example of this is a truck that started at a business located in the study area (Calgary, Airdrie, High River etc.) and makes a delivery to an out of region location (eg. Edmonton, Lethbridge, Canmore etc.) and returns to its origin by the end of day. The survey will have the same location name in both origin and destination categories with the stop locations, for deliveries and pickups documented.

Table 4 provides the distribution of trucks based on **today's** origin and destination.

The areas are defined as follows:

1. Calgary includes the area within Calgary corporate limits.
2. Calgary Region (excluding Calgary) includes the Municipal District of Rocky View and Foothills, part of the County of Vulcan (to Vulcan), and the County of Wheatland (to Standard). (see Figure 1)
3. Edmonton region includes the City of Edmonton, all cities/towns in the vicinity (eg. Sherwood Park, Leduc, Fort Saskatchewan etc) and Nisku.

4. Rest of Alberta represents the balance of the Province not included in the above previously defined areas.
5. Rest of Canada excludes British Columbia, Saskatchewan and Manitoba which are aggregated separately.

The objective was to interview truck drivers at the perimeter of the study area cordon. However, for reasons of safety, some of the survey locations had to be located within the study area. As an example the weigh station for Highway 2 North is located south of Airdrie, however a location closer to Crossfield would have been more desirable. The consequence of this is the reader will notice some trucks have origins in Calgary and destinations in the regional study area, and vice versa. This is a result of survey locations and does not represent the total of intra-regional truck trips. The larger Commodity Flow survey will provide a more complete picture of these trips.

Table 4 shows that about 49% of the trucks on the highway system originate or were destined to Calgary or Calgary Region, and nearly one third of all trucks originate or are destined to locations in the Rest of Alberta. Overall 77% of the trucks on the highway system are involved in the movements of goods within the Province of Alberta.

On an average day 1714 trucks from Calgary and 791 trucks from the Calgary Region are round tripping. This indicates the role these locations are playing as distribution centres to surrounding areas as near as Canmore and as far as Edmonton.

Table 4: Today's Origin/Destination for Trucks

DESTINATION ORIGIN	CALGARY	CALGARY REGION	EDMONTON REGION	REST ALBERTA	BRITISH COLUMBIA	SASK MNTBA	REST CANADA	UNITED STATES	TOTAL
CALGARY	1714	366	453	1318	349	275	17	116	4608
CALGARY REGION	99	791	30	777	41	46	11	36	1831
EDMONTON REGION	465	52	158	170	38	19	.	57	959
REST OF ALBERTA	1254	666	165	1766	209	88	10	80	4238
BRITISH COLUMBIA	485	20	49	100	50	170	30	7	911
REST OF CANADA	14	.	.	3	17	.	.	.	34
SASK AND MANITOBA	310	31	16	57	113	17	.	6	550
UNITED STATES	61	26	66	51	13	4	.	8	229
TOTAL	4402	1952	937	4242	830	619	68	310	13360

Outside of Alberta, the adjacent provinces of British Columbia and Saskatchewan are the largest origin/destination areas followed by the United States. Approximately 2400 (18%) of all trucks pass through Calgary and region without stopping

Although the movement of goods from the Rest of Canada to Calgary is relatively small it must be remembered that the rail system also plays a significant role in goods movement and Calgary is the location of major intermodal rail terminals.

Table 5 shows **original** origin and **final** destination truck table. This table further emphasizes the role of Calgary and the Calgary Region in the distribution of goods. Table 5 shows that 25% (3324) of the trucks were actually based in Calgary and 11% (1405) were based in the Calgary Region. This represents trucks that are travelling outside the Calgary area for more than one day that will eventually be returning to Calgary.

Table 5: Original Origin and Final Destination of Trucks

DESTINATION ORIGIN	CALGARY	CALGARY REGION	EDMONTON REGION	REST OF ALBERTA	BRITISH COLUMBIA	SASK AND MANITOBA	REST OF CANADA	UNITED STATES	TOTAL
CALGARY	3324	83	117	283	195	160	43	121	4326
CALGARY REGION	72	1405	24	160	21	40	15	23	1760
EDMONTON REGION	90	17	555	71	61	35	8	95	932
REST OF ALBERTA	260	117	91	2643	118	89	12	134	3464
BRITISH COLUMBIA	301	9	87	85	315	205	106	55	1163
SASK AND MANITOBA	135	19	42	39	106	336	.	60	737
REST OF CANADA	71	.	22	31	158	15	71	26	394
UNITED STATES	103	4	179	33	40	19	13	193	584
TOTAL	4356	1654	1117	3345	1014	899	268	707	13360

Of special interest is the trade corridor between the United States and Alberta. Table 5 indicates that 584 trucks have an original origin in the United States. The following summarizes the percentage distribution of trucks from the United States, to the highways accessing the Calgary region:

Highway 2 South	27.3%
Highway 22 South	23.0%
Highway 23 South	22.4%
Highway 1 East	24.8%
Highway 1 West	2.5%
	100%

3.3 Truck Modal Split/ Occupancy

Table 6 shows the percent of trucks of all vehicles (truck modal split) by each highway location. Overall trucks comprise over 15% of all vehicles on the highway system. The primary highways have truck percentages ranging from 22.3% (TCH East) to 9.7% (TCH West). The table shows that a number of the secondary highways – 21, 22 South, 23 South, 541, 806 and 901 - have truck percentages exceeding 20%.

Table 6: Percent Trucks of All Vehicles

Highway Location	Modal Split (%)
TCH East	22.3
TCH West	9.7
1A	6.5
2 North	13.5
2 South	18.8
9	19.4
21	33.1
22 North	10.7
22 South	24.6
23 South	27.2
534	10.3
541	45.1
542	13.6
561	14.3
806	20.0
901	31.5
Average for All Locations	15.3%

Table 7 shows the average occupancy by truck type.

Table 7: Truck Occupancy

Truck Type	Occupants per vehicle
Single Axle, Single Unit	1.18
Dual Axle, Single Unit	1.19
Semi, No Trailer	1.05
Semi, One Trailer	1.11
Semi, Multi Trailer	1.08

3.4 Goods & Services Movement

Table 8 shows the commodities carried by the different vehicle types. The table below reflects commodities based on number of trucks and not weight, volume or number of items.

The table shows that semi trailers are the dominant carrier of commodities on the highways. The most prevalent commodity types are farm/ food industry, energy related products and manufacturing/machinery. Overall 22% of the trucks are empty.

Table 8: Distribution of Trucks by Commodity Type

Commodity Type	Vehicle Type	24hour Truck	
		Single Units	Semi Units
TYPE1 : Farm, Food industry		3.5%	17.7%
TYPE2 : Energy industry such as oil, mining, chemical, mineral, stones		3.8%	13.3%
TYPE3 : Manufacturing, Machinery, Equipment, transportation and so on		7.0%	12.0%
TYPE4 : Wood, lumber industry		2.6%	7.6%
TYPE5 : Waste, hazardous materials, waste hazardous substances		1.4%	0.8%
TYPE6 : Miscellaneous		3.1%	6.6%
TYPE7 : Empty		4.7%	15.9%
Sum		26.1%	73.9%

3.5 Truck Ownership

Table 9 shows that nearly 61% of total trucks are owned by the companies producing goods being shipped and 25% of trucks are owned by a different company or driver.

Table 9: Distribution of Truck Ownership

Ownership	24 Hour	
	Vehicle	%
Owned by company producing goods being shipped	8,146	60.9
Leased and operated by company producing goods being shipped	1,822	13.6
For Hire: Owned by a different company or driver	3,392	25.4

4.0 Conclusion

Trucks are critical to the economic vitality of urban centres. They distribute goods produced by industries and supply the materials to maintain production activities. Planning infrastructure for goods movement on the external highway system requires knowledge of the types of trucks and the origin destination patterns of these trucks. Although the highway system serves interprovincial and international goods movement, the external truck study showed the trucks on the Calgary region highway system are primarily involved in the movement of goods within Alberta.

5.0 Appendix

5.1 Survey Form

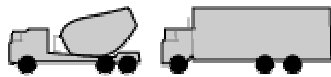
		Location:	
		Interviewer: Page #:	
Direction:		Direction:	
Time:		Time:	
Truck Type		Truck Type	
# Axles:		# Axles:	
Gross Vehicle Weight(kg):		Gross Vehicle Weight(kg):	
Occupancy		Occupancy	
Vehicle Ownership: <input type="checkbox"/> Owned by company producing Goods being shipped <input type="checkbox"/> Leased and operated by company Producing goods being shipped <input type="checkbox"/> For HIRE: Owned by a different company or driver		Vehicle Ownership: <input type="checkbox"/> Owned by company producing Goods being shipped <input type="checkbox"/> Leased and operated by company Producing goods being shipped <input type="checkbox"/> For HIRE: Owned by a different company or driver	
Today's Origin:		Today's Origin:	
Today's Destination		Today's Destination	
Original Origin:		Original Origin:	
Final Destination:		Final Destination:	
Commodities Carried at point of interview Commodity Quantity \$ Value		Commodities Carried at point of interview Commodity Quantity \$ Value	
Stop Section : Fill Out for Each Vehicle Stop made in Calgary and Region or Planned to be in Calgary and Region		Stop Section : Fill Out for Each Vehicle Stop made in Calgary and Region or Planned to be in Calgary and Region	
Stop1: Location of Stop: Reason for Stop: Arrival time: Departure Time: Commodity Delivered: Quantity Delivered: Value of commodity Delivered: Commodity Picked Up: Quantity Picked Up: \$ Value of Commodity Picked Up		Stop1: Location of Stop: Reason for Stop: Arrival time: Departure Time: Commodity Delivered: Quantity Delivered: Value of commodity Delivered: Commodity Picked Up: Quantity Picked Up: \$ Value of Commodity Picked Up	
Stop2: Location of Stop: Reason for Stop: Arrival time: Departure Time: Commodity Delivered: Quantity Delivered: Value of commodity Delivered: Commodity Picked Up: Quantity Picked Up: \$ Value of Commodity Picked Up		Stop2: Location of Stop: Reason for Stop: Arrival time: Departure Time: Commodity Delivered: Quantity Delivered: Value of commodity Delivered: Commodity Picked Up: Quantity Picked Up: \$ Value of Commodity Picked Up	

5.2 Vehicle Types

Single unit, single axle:



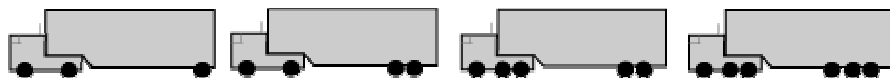
Single unit, dual axle:



Semi, no trailer:



Semi, one trailer:



Semi, multi-trailer:

